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A NEW CATTLE-PEST.

BY S. W. WILLISTON.

ON October 5, 1887, I received from Professor Cope specimens of a fly taken from the cattle of Mr. Thomas Sharpless, of West Chester, Pa., with the information, shortly afterwards, that the flies had been observed during the year at that place in small swarms, resting on the horns of the cattle, near the base, when not feeding, having the appearance, at a short distance, of small patches of foreign matter. The horns were merely a resting-place, to which the flies quickly returned when disturbed or driven away, the individual flies feeding upon the blood of the animals, concealed in the hair along the flanks. The flies, I was also told, were observed the same year on the land of Mr. George Pim, of Marshallton, Chester county.

I am thus particular in giving the facts as told to me, for this is the first record, of which I am aware, of the introduction from Europe of a cattle pest that bids fair to extend itself over the whole United States, and be as troublesome as its nearly related pest, the well-known stable-fly, or cattle-fly, also European originally, *Stomoxys calcitrans*, Linn.

I had never seen or heard of the fly before, and for that reason immediately reached the conclusion that it was an introduced species. A careful search of the literature, however, gave but slight clue to its identity, though it was immediately seen to be a member of the genus *Hematobia*, which, by Schiner, was looked upon as forming a division of the genus *Stomoxys*. In the early spring of the following year specimens of the same fly were sent me by Professor Riley, from, I believe, somewhere in New York and New Jersey, and more recently Mr. Howard reports it from Delaware and Virginia. Not knowing what else to call the insect, I gave it the provisional name *H. cornicola*. The examination, for the first time the past spring, of male specimens, sent me by Mr. Howard, led me to suspect that the species was identical with *H. serrata* Robineau Desvoidy, from the south of France, and in a late number of *Entomologica Americana* the fly was de-

scribed under the name of *cornicola*, as a doubtful synonym of *serrata*. Since the publication I have learned that the fly had been positively identified as *H. serrata* for Prof. Lintner by Mr. Kowarz, of Bohemia, whose authority on the subject is the best. The fly will thus be known as *Hæmatobia serrata* Rob. Desv., and in the vernacular the name used by Mr. Howard, in "Insect Life," of Horn-fly, seems the most appropriate.

So much for a brief history of the actual and probable pest in our own country, and this history, brief as it is, seems fuller than that of it in its own home, for I can find but very little in reference to it. Desvoidy described it in 1830, and Macquart gave an equally brief description of it in 1838. Rondani separated the species into another genus, which he called *Lyperosia*, in 1856, and Robineau Desvoidy, about the same time, gave it the name *Priophora*. It may be that these names will obtain acceptance, one or the other (for they are not synonymous), for these species, but the characters are based upon minute differences of the bristle of the antennæ or a secondary sexual character, and the time is not yet when we may accept them. It is much to be desired that the name of a common pest may remain unchanged, but so long as we know so little of its allies it is impossible to preclude change in the nomenclature.

The fly belongs to the family Muscidæ, and in the group Stomoxyinæ, which some excellent entomologists deem equivalent in rank to the Muscidæ (or Muscinæ). It will be distinguished from the common cattle-fly by its smaller size, and more especially by its long palpi, and has for its immediate allies some of the most vexatious of flies indigenous to Europe, Asia, Africa, Australia, North and South America. Two of these are well-known to all, either by repute or experience,—the cattle-fly and the tsetse-fly. *Stomoxys calcitrans* was doubtless originally European, but its spread has been almost coëxtensive and contemporaneous with man. In the United States it reaches from the Atlantic to the Pacific, a torment to both domestic and wild animals, and I have seen specimens from Rio de Janeiro. The tsetse-fly, (*Glossina*, of Africa), of which several species are known, has been, perhaps, the most famous of all for its poison-

ous effects upon horses and dogs, though only annoying to man. Very recently another species of the tsetse-fly has been discovered in Australia, with similar "poisonous and pestilential" habits. A genus allied to *Stomoxys* is ascribed to South America, though I know nothing further concerning it.

Among the diptera we have a number of families of widely different structure and habits that subsist, either wholly or in part, upon the blood of mammals, including the mosquitoes (Culicidæ), with about one hundred and fifty known species, scattered over a large part of the world, the Simuliidæ, with the Buffalo gnat, and about sixty other widely-distributed species, the horse-flies (Tabanidæ), with over thirteen hundred known species, the score or two of species of Stomoxyinæ, and a few species of Chironomidæ and Leptidæ. In all these flies it is the female only that draws blood, and they all seem to have the ability to emit a poisonous saliva into the wound they make, in some of a more irritating nature than others. The males, in general, are harmless, lounging fellows, with a proboscis weaker than in the female, used in sipping nectar from flowers; or the sweet sap of plants. They are not so commonly found as the females, and of the tsetse-fly are still unknown. *Hæmatobia serrata* has habits very similar to those of *Stomoxys*, as stated in Insect Life. The eggs are deposited in fresh cow manure, and only twelve days are required for the insect to acquire its adult condition. What its future in America will be one cannot say; there can be but little doubt, however, that it will soon spread over the entire United States.

It is very probable that the largest number of cosmopolitan insects are found among the Diptera. Reasons therefor we can readily find; they furnish the greater number of our domestic pests, and their eggs or larvæ are constantly mingled with our food material, or common objects of commerce. Indeed, the wonder is not that there are so many species that follow man in his colonizations and migrations, but that the number is so few. *Musca domestica*, that inseparable companion of man, is believed to occur everywhere about his dwellings; even on the uninhabited plains of America it abounds, as Professor Snow has

observed, and as I can corroborate. Rather interestingly, too, like other domestic animals, it seems subject to modifications of climate and environment to such an extent that several varieties have been described from the different countries it inhabits. Almost equally widely distributed are the other plagues of the housewife,—the blue-bottles, *Calliphora vomitoria*, *C. erythrocephala*, *Lucilia cæsar*, and *L. cornicina*,—all of which have distributed themselves from Europe throughout the length and breadth of North America, and some even into South America.¹ In fact, little as we know about the Muscinæ of our country, nearly a score of species are known to be identical with European ones.

But we have no right to say that all such species are importations; some, perhaps many, of them undoubtedly are, but assuredly not all of them are. And even those whose original habitats have been extended through commerce, we may as rightly believe to have been *exported*, in many instances, as *imported*. Commerce with America far antedates the systematic or even superficial study of insects, and the dissemination of insects would as likely be to as from Europe. The Colorado beetle is a striking instance coming within our own observation. The Hessian fly is another that stands almost on the border line of history, and though, as Professor Riley shows, we have every reason to believe that it was originally an European insect, yet had reliable evidences of its occurrence in North America extended back a few years earlier we should never have known whether we had Europe to thank for the pest, or Europe us, as she has more recently for the phylloxera and grape-vine fungus, or whether, indeed, there should be no exchange of thanks at all, the insects being “at home” in both continents. The screw-worm fly, *Lucillia macellaria*, occurs from Canada to Patagonia; will it become naturalized in Europe?

The distribution of many species in both Europe and North America opens up a number of interesting questions about which

¹ *Calliphora vomitoria* has been accredited to South America, but in the examination of considerable material from Brazil I have not found either of the Luciliæ, though a closely allied South American species appears to take their place.

opinions will differ. Doubtless other orders have many such cases, but my studies enable me to speak of the two-winged flies only. In but a very few families of flies, in reality I may say in but one or two, do we have even a tolerable knowledge of the North American fauna. In quite a number, however, our knowledge is sufficient to base fairly good conclusions as regards distribution, and these conclusions lead me to the belief that almost invariably species of flies common to the two continents have an unusually wide distribution in this country. Ten per cent. of our species of Syrphidæ, a family of flies that comes rarely into direct relation with man's economy, are common to the two continents. Of the thirty species thus known very nearly all are found from the Atlantic to the Pacific, forming very nearly a half of the species that are known to occur across the United States. In the family of Tabanidæ, or horse-flies, not a single one of the hundred and fifty species is known to be common to the two continents, and very few species in the United States have a wide distribution. Among the Asilidæ, a large family of predaceous flies, one species, and one only, is known to extend into the two continents, and this one species is one of the four or five that are found on the Pacific and Atlantic coasts. In numerous other cases I have observed similar facts, and always confidently expect to find such species reappearing in the Western fauna. What conclusions may we draw from such facts? That their distribution has been due to commerce? Or, that they are indigenous throughout their extended habitats, persistent forms that have survived unchanged from preglacial times? Among the desmids, out of about three hundred species accredited to the United States, only about one-third are said to be peculiar to our fauna, the others common to all parts of the world, though chiefly European. As among other insects, I have found species of flies occurring only in the White Mountains and the Pacific fauna, which indicates the persistency of their types from different geological and climatic conditions. The circumpolar habitat of many such species may, as Osten Sacken suggests, account for their occurrence on the two sides of the continent, as well as in Europe, but it is purely gratuitous to say

that it will account for all, and the notable case brought forward by the same author of *Catabomba pyrastris* is a pertinent one. This European species occurs in abundance in the western United States and in Chili, but has never been found east of the Missouri river. So, too, I doubt not that the European *Eristalis tenax* was at home, at least for awhile, on the Pacific coast before it suddenly spread eastward about 1870.

On the other hand many species that we should naturally expect to find on the two continents are yet confined to the one. Some, if not many, of these have failed to migrate simply because a good opportunity has never occurred, and our *Hæmatobia* is evidently of this class. But for others other explanations must be sought for. As the black rat and the Norway will not abound in the same region, so it is not unreasonable to suppose that the incompatibility, if one may so put it, of many species will prevent their living in common. Again, too, possibly the numerous parasites of insects may find an adaptability to newly introduced forms that may not only keep them in check, but actually keep them from obtaining a foothold. More potent causes undoubtedly are the climatic conditions and food supplies. As before intimated, those families of flies having the widest range of distribution for their species have generally the largest number of "foreign" species, while those in which the habitats are restricted have but few such species. A possible explanation for the latter is that a greater struggle for existence has weeded out the poorly favored ones and adapted the remainder more closely to the immediate environments. Certain it is that many of those families that are confessedly difficult to the systematist are the ones having fewer "foreign" species.

However, the very extensive family of parasitic Tachinidæ have remarkably extended habitats for their species, while I do not recall a single species common to the two continents, though a number reach through the two Americas. This non-identity of forms may be more apparent than real, yet it is very singular that none have been recognized, while in the related family of Anthomyidæ nearly a third of the recognizable hundred or so species are "European," and the family has, if anything, been

less studied than the Tachinidæ. Professor Riley has proposed the feasibility of introducing the European Tachinid parasite of the asparagus beetle, but my opinion is that such an attempt would fail, though it would certainly be very interesting. The difficulty in the way of the insect host may be the cause of such non-importation, but it hardly seems so, for many species are parasitic upon numerous forms, and American parasites allied to the European ones have, in not a few instances, adapted themselves to European insects that have been introduced into, or at least occur in, this country.

In the parasitic family of bot-flies it is probable that all the species common to the two countries (eight) have been introduced with the domestic animals, with the exception of the circumpolar reindeer bot-fly. They all occur from the Atlantic to the Pacific,—that is, those of the United States,—and not a single species of their respective genera (leaving out the doubtful case of *Hypoderma bonassi*) is indigeneous. In the genera *Cuterebra* and *Cephenomyia* not a single species is known to occur outside of North America. Among the mosquitoes three or four species, from among about forty, are recorded as common to the two continents.

New Haven, Conn.

EXPLANATION OF PLATE.

- FIG. 1. *Hæmatobia serrata* R. Desv., female.
- FIG. 2. Head of male.
- FIG. 3. Head of female.
- FIG. 4. Hind foot of male.

PLATE XXX.

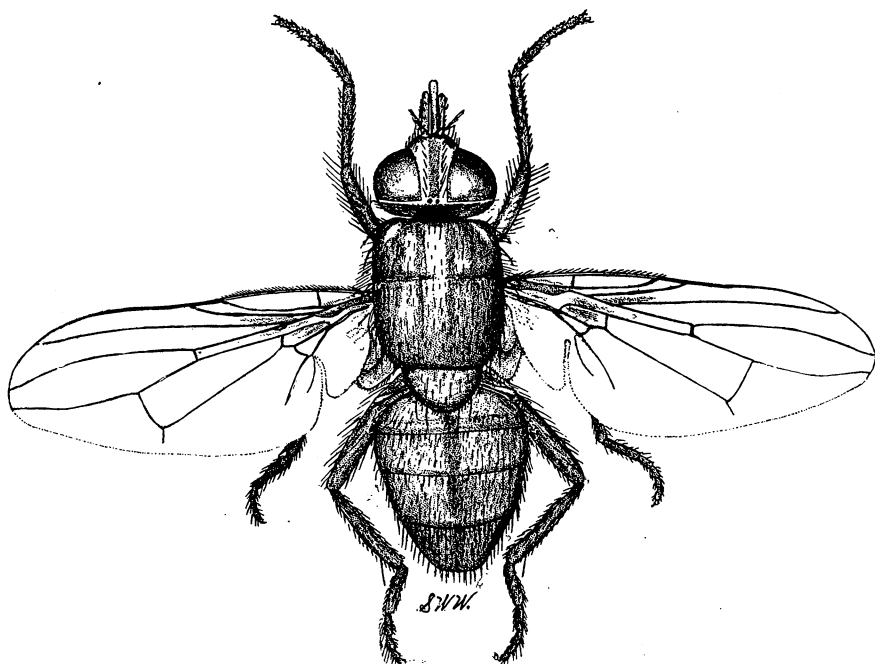


FIG. 1.

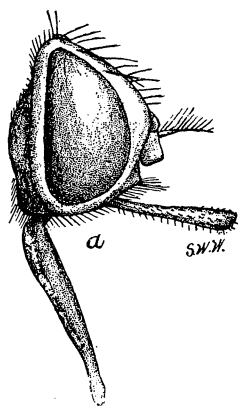


FIG. 2.



FIG. 4.

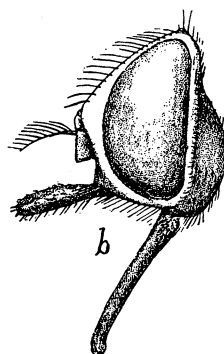


FIG. 3.